(12) UK Patent Application (19) GB (11) 2 186 781 (13) A

(43) Application published 26 Aug 1987

(21) Application No 8604590

(22) Date of filing 25 Feb 1986

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(51) INT CL⁴
A01G 15/00

(52) Domestic classification (Edition I):
A1X 2
B2E 1536 1747 418T 5155 M
B8P 112 116 G1

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Encyclopaedia Britannica 15th Edition, Vol. 16. pages 560 to 563.

(58) Field of search
A1X
B2E
B8D
B8P
B8T
Selected US specifications from IPC sub-classes A01G B65D

(54) Influencing meteorological phenomena

(57) A lightweight container of rigid plastics material comprises two united hemispheres 10, 12, each having six apertures 14. The container is covered by a layer of brittle and water soluble gelatine which forms closure webs 16 over the apertures. The container holds lightweight polystyrene beads which are coated with a mixture of silver iodide, solid carbon dioxide and common salt in a volume ratio of 3:2:1. To diminish a typhoon, a load of charged containers is released by an aeroplane whilst encircling the periphery of the typhoon. The closure webs 16 are opened by fracture under the shock of discharge, by solution by atmosphere moisture or solution into water onto which they may fall. After opening, the coated beads are dispersed and are effective in diminishing the typhoon. On account of their light weight, the beads remain airborne or float on a water surface for a prolonged period during which they remain active.

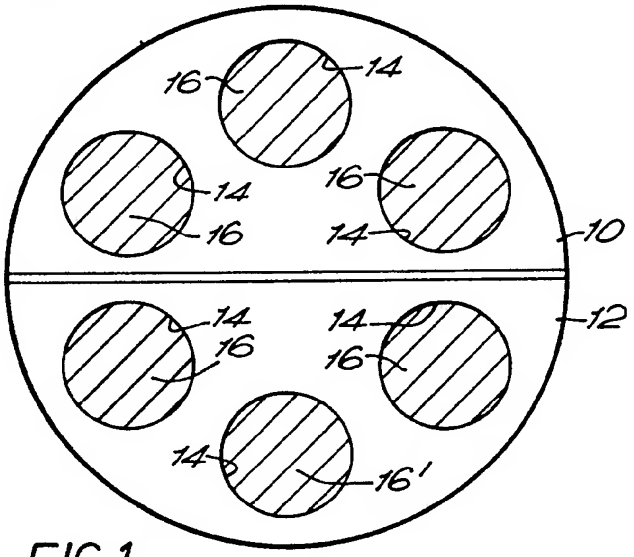

FIG. 1.

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The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1982.

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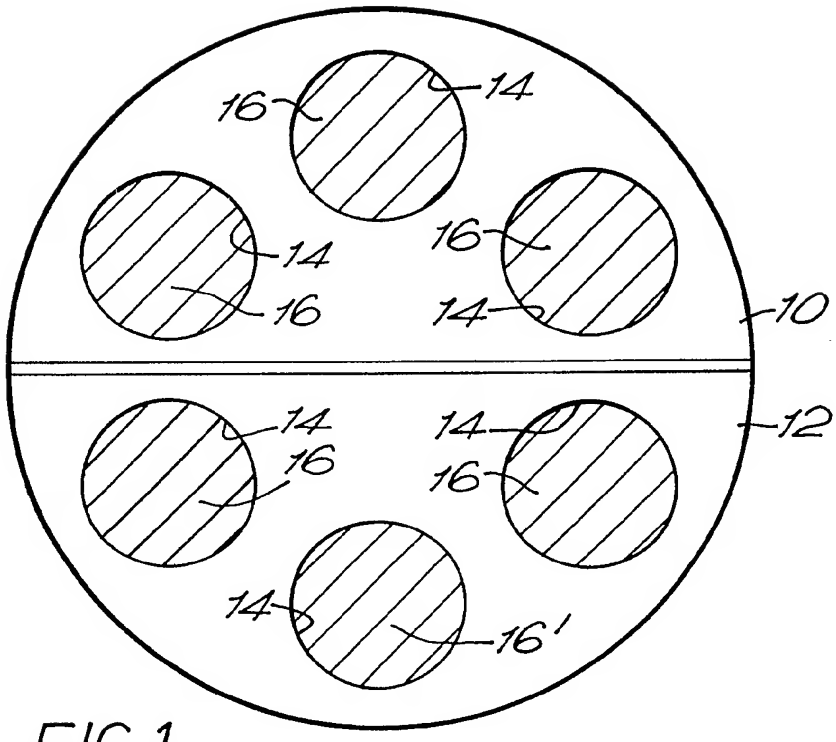

FIG. 1.

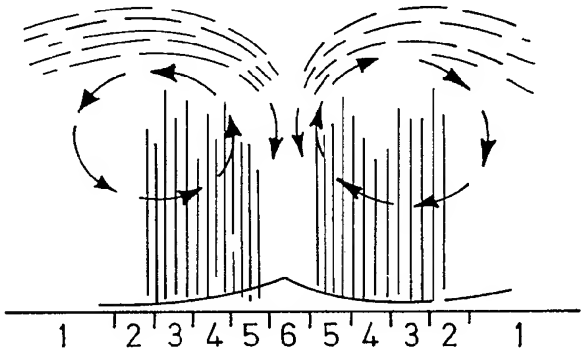

FIG. 2.

SPECIFICATION

Influencing meteorological phenomena

DESCRIPTION

This invention relates to the influencing of meteorological phenomena, for example cloud seeding and the diminution of typoons.

In one aspect, the invention provides a composition for use in influencing meteorological phenomena, comprising a plurality of lightweight carriers coated with a material or materials for producing the desired meteorological effect.

The coating material advantageously comprises at least one of (a) a crystalline substance and (b) a cryogenic system or substance.

Preferably the coating material comprises a crystalline substance and either a cryogenic substance or a plurality of substances constituting a cryogenic system.

The carriers should be sufficiently light in weight that, when coated, they can be dispersed into the atmosphere and remain airborne for a period of time sufficient for the desired meteorological effect to be achieved. Advantageously, the coated carriers will also float and remain active on the surface of the sea or any other adjacent water surface.

The crystalline substance is preferably silver iodide but any material suitable for producing a desired meteorological effect, for example cloud seeding, may be used.

The cryogenic substance is conveniently solid carbon dioxide ("dry ice") which is preferably used together with common salt to constitute a said cryogenic system.

Beads of foamed plastics material are preferred carriers, the plastics being, for example, polystyrene. Such beads are sold under the name "Styrofoam".

The lightweight carriers preferably have a particle size in the range of 3 mm to 10 mm and, more preferably, within this range and not greater than 6 mm.

The crystalline and cryogenic substances may be adhered to the carriers by an adhesive layer located between themselves and the surface of the carrier. This is however not the only way of achieving the coating and any other suitable means may be used.

The coating composition may comprise equal amounts by volume of crystalline substance on the one hand and cryogenic substance or system on the other. A convenient cryogenic system consists of a mixture of 2 parts solid carbon dioxide and 1 part common salt by volume. This can produce a temperature of −85° to −90°C. The proportions of the active substances used will be varied as a result of experimentation according to the actual use to which the substance is to be put.

Coating of the lightweight carriers may be carried out by any method, conveniently by mixing together of the components of the composition in a drum mixer.

The coated carriers according to the present invention are particularly suitable for the diminution of typhoons and are expected to be capable of much more effective use than, for example, silver iodide alone. Their uses are however not limited to this and may include dispersion of fogs and induction of rain.

The present invention also provides in another aspect a container for a particulate material, comprising an apertured shell, the or at least one aperture of which is closed by a web of material extending thereacross, the material being capable of transformation to a second condition in which the aperture is at least partially opened to allow release from the shell of any substance contained therein.

In its second condition, the web may be, for example, ruptured, or shattered, or, for example, may be disolved in an ambient solvent medium or dispersed by melting or evaporation. The web may thus comprise, for example, brittle or water-soluble material.

The container may be filled through the said aperture prior to formation of the closure web or, otherwise, may be filled through a further aperture having further closure means.

The shell is preferably of a lightweight material, for example a rigid plastics material such as polypropylene or polystyrene. It is advantageously spherical or substantially so.

In a preferred aspect of the present invention, the shells contain coated carriers according to the invention, the relative sizes of the carriers and the or each said aperture being chosen to allow release of the carriers from within the shell.

In another aspect, the present invention provides a method diminishing typhoons or influencing other meteorological phenomena, in which the typhoon or other phenomena is seeded with seeding means at or close to its outer edge.

The seeding means preferably comprises a composition in accordance with the present invention and is advantageously contained in the containers provided by the invention.

By way of example and with reference to the drawings, a composition according to the invention will now be described, together with a filled container embodying the invention and the use of the composition and container. In the drawings:

Figure 1 is a side elevation of the container; and

Figure 2 is a schematic view of a typhoon.

Spherical polystyrene beads having a diameter in the range of 3 to 5 mm were coated with a dilute solution of an adhesive and introduced whilst the adhesive was still wet into the drum of a steel drum tumbling mixer together with finely divided silver iodide crystals, solid carbon dioxide and powdered industrial salt (sodium chloride) in the following propor-

tions by volume:

silver iodide	3 parts
carbon dioxide	2 parts
salt	1 part.

After allowing the adhesive to dry, the coated beads were introduced into containers as shown in Fig. 1. Each comprises two united hemispheres 10, 12 of polystyrene forming a hollow sphere of about 18 cm in diameter, each hemisphere being perforated by six circular apertures 14 each of about 2.5 cm in diameter and the container being coated with a thin layer of brittle and water soluble gelatine covering the entire outer surfaces of the sphere and thus forming closure webs 16 over the circular apertures. To fill the containers, one gelatine web 16' of each container was shattered and coated beads introduced into the container until the interior volume was about 90% occupied by beads. The open aperture on each container was then sealed with adhesive tape.

Fig. 2 of the drawing shows the zones of a typhoon, the zones being numbered (1) to (6) and being named as follows: (1) outer edge zone, (2) weak zone, (3) inner zone, (4) dangerous zone, (5) storm zone and (6) eye.

To diminish a typhoon by use of the charged containers, the containers may be loaded into a transporter 'plane which will then fly to the outer periphery of a typhoon. From here, the 'plane encircles the typhoon while discharging the loaded spheres. A typical flight might involve discharge of the spheres over a distance of 150 to 300 miles (240 to 480 km), a typical typhoon being in the region of 300 to 600 miles (480 to 960 km) in circumference.

The shock of discharge of the loaded spheres and ambient moisture will cause their gelatine closure webs to shatter or dissolve and the coated beads to be discharged into the atmosphere, in which they will be effective in diminishing the typhoon. The seeding process should be repeated at intervals of between 1 and 2 hours until the typhoon is rendered harmless. The diminution will usually be stopped at this stage since the subsequent rainfall will usually be desirable in the region in which the operation is carried out.

After discharge from their spherical containers, the coated beads will remain airborne for a prolonged period of time because of their light weight. When they finally fall to the Earth, if a water surface is adjacent, they will float thereon and any remaining active coating will continue to be effective until its activity declines to zero.

It will be appreciated that the method of diminution of typhoons, or of influencing any other meteorological phenomenon, according to the invention is particularly efficient in the use of active substance since this stays airborne much longer than it would if used alone.

CLAIMS

1. A composition for use in influencing meteorological phenomena, comprising a plurality of lightweight carriers coated with a material or materials for producing the desired meteorological effect.

2. A composition according to claim 1, in which the coating material comprises at least one of (a) a crystalline substance and (b) a cryogenic system or substance.

3. A composition according to claim 2, in which the coating material comprises a crystalline substance and either a cryogenic substance or a plurality of substances constituting a cryogenic system.

4. A composition according to claim 3, in which the coating composition comprises equal amounts by volume of crystalline substance on the one hand and cryogenic substance or system on the other.

5. A composition according to any of claims 2 to 4, in which the crystalline substance comprises silver iodide.

6. A composition according to any of claims 2 to 5, in which the cryogenic substance comprises solid carbon dioxide.

7. A composition according to any of claims 2 to 5, in which the cryogenic system comprises a mixture of common salt and solid carbon dioxide.

8. A composition according to claim 7, in which the cryogenic system consists of a mixture of 2 parts solid carbon dioxide and 1 part common salt by volume.

9. A composition according to any preceding claim, in which the carriers are foamed plastics beads.

10. A composition according to any preceding claim, in which the carriers have a particle size in the range of 3 mm to 10 mm.

11. A composition according to claim 10, in which the particle size is not greater than 6 mm.

12. A composition according to any preceding claim, in which the crystalline and cryogenic substances are adhered to the carriers by an adhesive layer located between themselves and the surface of the carrier.

13. A composition according to any preceding claim, in which the coated carriers are buoyant and remain active on a water surface.

14. A composition for use in influencing meteorological phenomena, the composition being substantially as hereinbefore described with reference to the drawings.

15. A container for a particulate material, comprising an apertured shell, the or at least one aperture of which is closed by a web of material extending thereacross, the material being capable of transformation to a second condition in which the aperture is at least partially opened to allow release from the shell of

any substance contained therein.

16. A container according to claim 15, in which the web is rupturable.

17. A container according to claim 15, in which the web can be shattered.

18. A container according to claim 15, in which the web is water soluble.

19. A container according to claim 15, in which the web can be dispersed by melting or evaporation.

20. A container according to any of claims 15 to 19, having, for filling, a further aperture with further closure means.

21. A container according to any of claims 15 to 20 and of rigid plastics material.

22. A container according to any of claims 15 to 21 and of spherical or substantially spherical shape.

23. A container for a particulate material, the container being substantially as hereinbefore described with reference to the drawings.

24. A container according to any of claims 15 to 23 containing a composition according to any of claims 1 to 14.

25. A method of diminishing typhoons or influencing other meteorological phenomena, in which the typhoon or other phenomena is seeded with seeding means at or close to its outer edge.

26. A method according to claim 25, in which the seeding means comprises a composition according to any of claims 1 to 14.

27. A method according to claim 25 or 26, in which the seeding means is contained in a container according to any of claims 15 to 23.

28. A method of influencing meteorological phenomena, the method being substantially as hereinbefore described with reference to the drawings.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd, Dd 8991685, 1987.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.